

Professor SHEM OYOO WANDIGA



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Summary

Dr. Shem O. Wandiga is professor of Chemistry at the department of Chemistry, University of Nairobi . Professor Wandiga's research interests lie in studying sources and sinks of biogenic gases; persistent organochlorine pesticides in the tropics; trace metals concentration in various environmental media; and complexes of Group VB metals with sulfur and oxygen binding ligands; climate change and health. He is the author of several papers in these areas.

He has a Ph.D. from the Case Western Reserve University, U.S.A. Professor Wandiga was also Deputy Vice Chancellor (Administration and Finances) of the University. He was subsequently appointed as the Co-coordinator of the Policy and Planning Task Group of the Ministry of Education (1991), a US\$60.million credit to Kenya Government, which he successfully help negotiate and manage; elected as Kenya's representative to the Executive Board of UNESCO (1995), President of the External Relations and Program Commission of the Board (1997), member of the General Committee and the Advisory Committee on Environment of the International Council for Science (ICSU). Fellow: World Innovation Foundation (2002); IUPAC Fellow (2004) and Chair: Kenya Chemical Society (2004); Member: The International Jury 1999-, UNESCO Kalinga Prize for the popularization of Science; 2005, L'Oreal-UNESCO Award for women, Condensed Matter Science (Physics and Chemistry); 2004, UNESCO's International Basic Sciences Programme (IBSP) Board. Author of a large number of publications in scientific and educational fields and has

chaired several national committees on university education and been a consultant on World Bank, UNESCO and UNEP projects undertaken in Kenya and eastern Africa. Professor Wandiga was Chair of the Kenya National Academy of Sciences from 1992 - 2002, and Chair of the Pan African Committee of START (2001-) as well as past chair of the National IGBP Committee. Awarded Certificate by Ministry of Environment and Natural Resources, Government of Kenya (2004), for outstanding work on hazardous and toxic chemicals and pesticides.

EDUCATION

June 1967: B.Sc. - Chemistry, Howard University, Washington DC, USA

January 1972: M.Sc. - Chemistry, University of Maryland, USA

June 1972: Ph.D.-Chemistry, Case Western Reserve University USA

National Honour: EBS- December, 1986. Awarded Order of the Elder of Burning Spear, Second Class

EXPERIENCE

2004 Member of the Board, International Basic Sciences

Programme of UNESCO 2004: Chairman , Kenya Chemical Society.

2003: Country Co-ordinator, African Network of Chemical

Analysis of Pesticides, Kenya

2002 Chair - International Council for Science (ICSU) - World Summit on Sustainable Development Task Force

1999 - 2003 International Council for Science (ICSU) - Advisory Committee on Environment (ACE) Member

1997 Chair, Trace Elements Satellite Centre of UNESCO

(TESCU), University of Nairobi , Kenya

1998 - 1999 Member World Conference on Science, International Organizing Committee 13
Nov. 1997 - Nov. 1999 Elected Chairman, Programme and External Relations Commission of UNESCO Executive Board

September 26, 1996 - 1998 Elected Member - General Committee of the International Council of Scientific Unions (ICSU)

Nov. 9, 1995 - 1999 Elected Kenya 's Representative to UNESCO Executive Board.

Dec. 1994 and Expert Consultants to UNEP, IRPTC Expert

May 1995 Consultants meeting in Nairobi and Geneva

July 1992 Chairman, Kenya National Academy of Sciences

Chairman, IGBP Kenya Committee (1992-2002)

Chairman, Constitutive Committee of African Union of Pure and Applied Chemistry.

Member , Kenya Chemical Society

31st July, 1991 to Appointed Co-ordinator, University

30th June 1994 Investment Project

2nd March, 1988 to Appointed Deputy Vice-Chancellor

25th May 1994 (Administration & Finance)

4th June, 1987 to 1st March, 1988 Acting Deputy Vice-Chancellor (Administration & Finance)

October 1983 to Principal, College of Biological and Physical

3rd June, 1987 Science

September 1984 Professor of Chemistry

1983- Chairman, Natural Sciences Committee UNESCO National Commission and member of Kenyan Delegation for UNESCO general Conference to date

February to July 1981 Visiting Scientist, National Centre for Atmospheric Research, Boulder , Colorado , USA . Salary \$29,826 of which 54% was paid by NCAR and the rest by my University. I was on Sabbatical Leave.

September, 1984 Associate Professor of Chemistry

September 1, 1977 to October, 1983 Chairman, Department of Chemistry with the responsibility for the academic planning and management of the department servicing 600 students and having 46 staff members

August 1976 to June 1979 Senior Lecturer, Inorganic Chemistry. Responsible for the activities of the inorganic Chemistry Section, teaching of inorganic Chemistry to undergraduate and postgraduate students. Supervision of advanced degree theses.

October 1972 to August 1976 Lecturer, Inorganic Chemistry. Responsible for the teaching of Inorganic Chemistry to Undergraduate students and supervision of postgraduate students.

March 1972 to September 1972 Temporary Assistant Professor of Chemistry, Inter-American University , San Juan , Puerto Rico . Left to take up the post at the University of Nairobi .

September 1969 to January 1971 Teaching Assistant at Case Western Reserve University and University of Maryland . Responsible for the supervision of laboratory and tutorial assignments for 1st, 2nd and 3rd year students.

PROFESSIONAL ACTIVITIES

1976 to 1999 Co-ordinator of the Eastern and Southern African Environmental Chemistry Network Workshops of the Association of Faculties of Science of African Universities (AFSAU), Chemistry Committee.

1980 Vice-Chairman of the organizing Committee of the Regional Chemistry Conference in Africa, The First International Chemistry Conference in Africa, July 28 to August 1, 1980. I was responsible for the planning and organization of the conference which was co-sponsored by several international organizations and Kenya Chemical Industry Firms. The conference brought together participants from 32 African and European countries.

1982/83 Chairman, Organizing Committee, Second International Chemistry Conference in Africa , June 28 to July 2, 1983 .

UNIVERSITY OF NAIROBI ACTIVITIES

Member, University Senate, the highest academic body 1973 - 1995. Chairman, Faculty of Science Brochure and Calender Sub-Committee, Housing Allocation Committee.

1983 Founder Member and Fellow of the Kenya National Academy of Sciences and Chairman of its Awards Committee.

NATIONAL ACTIVITIES

Member, Board of Directors, Kenya Industrial Research and Development Institute. Member, Natural Science Advisory Research Committee; Mt. Kenya Baseline Monitoring Station Advisory Panel to the Kenya Government; Chemical Industry Training Committee, the Ministry of Labour, Kenya Government; Inter-Ministerial Committee on Solving a Tanning Industry Firms Pollution to Thika Town; Several Advisory Committees to the Environmental Secretariat.

RESEARCH INTERESTS

My research interest lies in the design, synthesis and characterization of metal chalets which have apparent utility as chemotherapeutic agents and as models for metal binding dynamics in biological systems. Second interest is the design, synthesis and characterization of metal chelates with unique structural features, stereochemistry, optical activity and electronic properties. In all of my research interests the use of most analytical instruments are involved. A third interest is in Environmental Chemistry. In this project the analysis of trace elements at ppm to ppb by polarography and AAS is being studied. Dissipation and degradation of persistent pesticides in the tropics is also being studied. The biogenic emission sources of trace atmospheric gases research has also been conducted, as well as dissipation of organochlorine pesticides in the tropics.

RECENT PUBLICATIONS

1. ¹H.N.M.R. Evidence for the pseudo Octahedral Geometry and Ready Racemization of 1,1,1-Tris-(pyridine-2-carboxaldiminomethyl)-ethaneiron(II), F. L. Urbach and S. O. Wandiga, *J. Chem. Soc. Chem. Commun.*, 1572 (1970).
2. "The Electric Dipole Moments of Monohalogen Derivatives of German", J. M. Bellama, S. O. Wandiga and A. A. Maryott, *Inorg. Nuclear Chem. Letters*. 7, 71 (1971).
3. "Transition Metal Complexes with Schiff Base Derivatives of 1,1,1-Tris-(aminomethyl)-ethane", S. O. Wandiga, J. E. Sarneski and F. L. Urbach, *Inorg. Chem.* 11, 1349(1972).
4. "Dipole Moments of Halogenogermanes from Non-Resonant Absorption of Vapours", J. M. Bellama, S. O. Wandiga and A. A. Maryott, *J. Chem. Soc. Faraday Trans.* 11, 70 719 (1974).
5. "Hydrogen-1 Nuclear Magnetic Resonance Evidence for Exchange Reactions in Antimony (III) Cysteine System and Synthesis of Antimony (III) Compounds of 3,3-Dimethyl-cysteine, Toluene-3,4-Dithiolate, Dicyanoethylene-1-2-Dithiolate and 2,3-Bis(Thiosemicarbazono-butane)", S. O. Wandiga, *J. Chem. Soc. Dalton Trans.*, 1894(1975).
6. "Pollutants; Their Effects on Man, Vegetation and Material", S. O. Wandiga, *Post Kenya* 11 23 (1975).
7. "The Formation of Tris(2-4-Pentanediono) Chromium (III) in the presence of Trichloroethanoate and other Carboxylate ions in Aqueous Solutions", H. Ssekalo and S. O. Wandiga, *J. Inorg. Nucl. Chem.* 39, 769-771 (1974).
8. "Interference Effects of Different Metal in the Atomic Absorption Spectrophotometry Determination of Chromium", C. G. Nyagah and S. O. Wandiga, *Fresenius Zeitschrift Fur Analytische Chemie*, 296 135-139 (1979).
9. Use of Complexing Ligands in the Determination of Antimony and Tin by Atomic Absorption Spectrophotometry, C. Gathu Nyaga and S. O. Wandiga, *Talanta*, 26, 333 (1979).
10. Some Group VB Chloride Complexes with Thiourea and N,N'-diethyldithioamide, S. O. Wandiga, L. J. Jenkins and G. R. Willey, *J. Inorg. Nucl. Chemistry*, 41 (7), 941 (1979).
11. Analysis of Chemical Pollution in Some Kenya Water Systems with Special Reference to Lake Nakuru, S. O. Wandiga, in the Role of Water Resources in Development, Proceedings of the 13th Annual Symposium of the East African Academy, September 1977, p.120.
12. Induced Optical Rotation in Zinc(II) and Cobalt(II) Complexes Derived from 1,1,1-Tris-(aminomethyl) ethane and cis, cis-1,3,5-Triaminocyclohexane, S. O. Wandiga, *Kenya Science and Technology Journal*, 1980 Series A: 1 (1), 23-26.
13. The Concentrations of Zinc, Copper, Cadmium and Lead in Rivers and Lakes in Kenya, S. O. Wandiga, *Sinet*: 1981, 3, 67.
14. Environmental Pollution Consideration in Wildlife Management, S. O. Wandiga, A Paper presented at the 6th African Wildlife Conference, 13-19 July, 1980, Nairobi, Kenya.

15. Determination of Mercury in Body Beauty Soaps and Creams Sold in Kenya, S. O. Wandiga, I. O. Jumba, Kenya J. of Science & Technology, (A) 3 89-91 (1982).
16. National Standards and Environmental Pollution, S. O. Wandiga, A paper presented at a Seminar organized by Kenya Bureau of Standards on National Standards and Technology for Development. Hotel Oceanic, Mombasa , 1982.
17. Factors Affecting the Simultaneous Determination of Lead, Cadmium, Copper and Zinc Concentration in Human Head Hair Using Differential Pulse Anodic Stripping Voltammetry and Flame Atomic Absorption Spectrophotometry, S. O. Wandiga and I. O. Jumba, Kenya Journal of Science and Technology (A) 3, 9-25 (1982).
18. The Concentration of Heavy Metals: Zinc, Cadmium, Lead, Copper, Mercury, Iron and Calcium in Head Hair of Randomly Selected Sample of Kenya People, S. O. Wandiga and I. O. Jumba, Kenya Journal of Science and Technology (A) 3, 27-41 (1982).
19. Termites: A Potentially Large Source of Atmospheric Methane, Carbon Dioxide and Molecular Hydrogen. P. R. Zimmerman, J. P. Greenberg, S. O. Wandiga and P. J. Crutzen, Science, 218, 563, (1982).
20. The Future of Atmospheric Chemistry in Africa , S. O. Wandiga, Impact of Science on Society, 1982. (3), 339-345.
21. DDT Persistence in a Tropical Climate, S. O. Wandiga and H. C. B. Natwaluma, Kenya Journal of Science and Technology. Series (A), (1984) 5, 31-44.
22. Concentration of Heavy Metals in Water, Sediments and Plants of Kenya Lakes . S. O. Wandiga, J. M. Molepo and Lenah N. Alala , Kenya J. of Science and Technology. Series (A) (1983) (2): 89-94.
23. Analysis of Nitrosamines in Grains, Flours and Local Alcoholic Beverages, S. O. Wandiga, Final Report to the National Council for Science and Technology Grant No. NCST/SEC/440055, 1983.
24. Effects of Chemical Events on Environment in Africa . S.O. Wandiga- Proceedings of the Pontifical Academy of Science's Study Week on "Chemical Events in the Atmosphere and Their Impact", November 1983, P.649-673.
25. Organic Chemical Pollutants in Water, S.O. Wandiga, Proc. 1982 Environmental Chemistry Workshop. The National University of Lesotho , 6-13 December, 1982.
26. Degradation and Dissipation of Persistent Pesticides in the Tropics (part of a co-ordinated programme on the Fate of persistent pesticides in the Tropics, using Isotope techniques) presented at IAEA/FAO. First Research Co-ordinating Meeting, University of Florida , Gainesville, U.S.A 19-23 March, 1984.
27. Studies on Dioxamide and Dithio examide Metal Complexes. Part 2 Synthesis and Spectral Characterisation of RNH C(S)C(S)RHR (R=Alkyl or Aryl) Complexes with SbX₃ (X=Cl or Br), BiCl₃, SnX₄ (X=Cl or Br), and TiCl₄, Crystal and Molecular structures of NH⁺-Diisopropylidithio-oxamide (L3 and SbCl₃(L3)1.5. Michael G.B. Drew, Jonathan M. Kisenyi, Gerald R. Willey and Shem O. Wandiga; J. Chem Soc. Dalton Trans. 1984,1717-1722.

28. Toluene-3, 4-dithiol (h₂tdt) Complexes of Group 5B Halides. Observations of Lone-Pair Stereochemical Activity and Redox Behaviour. Crystal and Molecular Structures of [(AsCL₉tdt)] and [pph₄]-[Sb₉tdt]₃. Jonathan M. Kisenyi, Gerald R. Willey, Michael G.B Drew, and Shem O. Wandiga; J. Chem. Soc. Dalton Trans. 1985, 69-74.
29. The State of Chemical Pollution in Kenya ; S. O. Wandiga. Kenya Journal of Sciences and Technology, Series (A), 1996. 11 (1-2): 18-33
30. Determination of γ -BHC (Lindane) in Breast Milk of Kenyan women; Shem O. Wandiga and Amy Mutere, Bull. Chem. Soc. Ethiopia. 2(1), 39-44 (1988).
31. Persistence of ¹⁴CDDT in the Tropical Soils of Kenya , S. O. Wandiga, J.M. Mghenyi, In "Isotope Techniques for Studying the Fate of Persistent Pesticides in the Tropics". IAEA-TECDOC-476, 19-26, (1988).
32. The Persistence of γ -1,2,3,4,5,6-Hexachlorocyclohexane (γ -HCH) in Tropical Soils in Kenya . Shem O. Wandiga and Johnam M. Mghenyi; "Isotope Techniques for Studying the Fate of persistent pesticides in the Tropics". IAEA-TECDOC-476, 77-82, (1988).
33. The Concentration of Heavy Metals: Manganese, Iron, Copper, Cadmium, and Lead in sediments from the Winam Gulf of Lake Victoria and Fish Bought in Mombasa Town Markets, Shem O. Wandiga and John M. Onyari, Kenya Journal of Sciences, Series A (1987) Vol. 8 (1-2): 5-18.
34. Methane Emissions by Tropical Termites Feeding on Soil, Wood, Grass and Fungus Combs, Shem O. Wandiga and James A. Z. Mugedo, Kenya Journal of Sciences, Series A (1987) 8(1-2):19-25.
35. Distribution of Cr, Pb, Cd, Zn, in Lake Victoria sediments, East Africa, J.M. Onyari and Shem O. Wandiga, Bulletin of Environmental Contamination and Toxicology (1989) 42 (6) 807
36. Regional Co-operation in Education for Accelerated Development, Shem O. Wandiga, The African Journal of Sciences and Technology Series C (1990) 11.
37. Prospects for University- Industry Co-operation in Africa . Shem O. Wandiga *ibid*, 1990 1, 17.
38. Report of the Kenyan IGBP National Committee Activities. S. O. Wandiga, 1990. Second Meeting of the IGBP Scientific Advisory Council. SAC II. 3-7 September, 1990. La Villette, Paris , France .
39. Lead Contamination in Street Soils of Nairobi City and Mombasa Island , Kenya , J. M. Onyari, S.O. Wandiga, G. K. Njenga and J. O. Nyatebe, Bull. Environ. Contamination and Toxicology; (1991), 46: 782-789.
40. River Pollution in Developing Countries - A case study. Effects of Waste Discharges on quality of Ruiruaka River Waters in Kenya , S.B. Jonnalagadda, A.S. Mathuthu, R. W. Odipo and S. O. Wandiga, Bull Chem. Soc. Ethiop. 4((2) 89-103(1990).

41. Mineral Composition of Tropical Forages in the Mt. Elgon Region of Kenya , 1. Macro-Minerals. I.O. Jumba, N.F. Suttle and S. O. Wandiga, (1996) Tropical Agriculture (Trinidad) (1996) 73 (2) 108 - 112. No. 1 (in press).
42. Effects of soil origin and mineral composition and herbage species on the mineral composition of forages in the mount Elgon region of Kenya . 1. Calcium phosphorus, magnesium, and sulphur. I.O. Jumba, N.F. Suttle, E.A. Hunter and S.O. Wandiga. Tropical Grasslands (1995), 29, 40-46.
43. Effects of soil origin and mineral composition and herbage species on the mineral composition of forages in the mount Elgon region of Kenya . 2. Trace elements. I.O. Jumba, N.F. Suttle, E.A. Hunter and S.O. Wandiga. Tropical Grasslands (1995), 47-52.
44. The Fate of 14C-DDT in Kenyan Tropical Soils, J. O. Lalah, F. N. Acholla and S. O. Wandiga, J. Env. Scie. Health (1994) B29 (i) 57-64.
45. Mineralization, Volatilization and Degradation and mobility of Carbofuran in Soil Samples from Kenya . Joseph O. Lalah and Shem O. Wandiga, Walter C. Dauterman. Bull. Environ. Contam. Toxic. (1996) 56. 37-41.
46. Distribution and dissipation of Carbofuran in a paddy field in the Kano Plain of Kenya. Joseph O. Lalah and Shem O. Wandiga (1996). Bull. Environ. Contam. and Toxic. 56 (4). pg. 584.
47. The persistence and Fate of malathion residues in stored beans (*phaseolus vulgaris*) and maize (*zea mays*), Joseph O. Lalah and Shem O. Wandiga, Pestic Science (1996)46 215-220.
48. Populations in nests of the termites *Macrotermes jeanneli* in Kenya, J.P.E.C. Darlington, P.R. Zimmerman and S.O.Wandiga, J. Trop. Ecol. (1992) 8, 73-85.
49. Organochlorine Pesticides: Curse or Blessing in Tropical Agriculture? S.O. Wandiga, In "Environment and Development" Proc. 1996. The Kenya National Academy of Sciences, Public Lecture Series.
50. Water Pollution - Effect of Industrial and Sewage effluent discharged on the quality of Nairobi River Water. R.W. Odipo, S.O. Wandiga and S.B. Jonnalagada (1995) Kenya Journal of Sciences, Series A 17 (1-2): 95-110.
51. The Adsorption/Desorption and Mobility of Cabofuran in a soil sample from Kenya . J.O. Lalah and S.O. Wandiga, 1996, Bull.Environ. Contamin. & Toxic. 56 (4) pg. 575.
52. Cost sharing in Public Universities: A Kenyan case study. A.J. Rodgrigues and S.O. Wandiga (1997) Higher Education Policy Journal, (1997). 10 (1), 55-80.
53. Occurence of Chloreinviphos residues in cow milk in Kenya . Kituyi, E.N., Jumba, I.O., Wandiga, S.O. (1997). Bull.Environ. Contamin. & Toxicol 58. (6) 969-975.
54. The fate and dissipation of surface applied 14 "C-DDE in a tropical soil. Lalah, Joseph. and Shem O. Wandiga (1998). J. Toxic and Environmental Chemistry 65, 9-16.

55. Mineral composition of tropical forages in the Mount Elgon region of Kenya . II. Trace Elements. Jumba, I.O. , Suttle, N.F. and Wandiga, S.O. (1996). Tropical Agriculture (Trinidad), 73 No. 1.
56. Impact of Industries on the environments. In Industries and Enforcement of Environmental Law in Africa . S.O. Wandiga, 1998. Industry experts Review environmental practice. UNEP/UNDP 9 - 23.
- 57 The metabolism and distribution of [14C-phenyl]-ethyl parathion in a tropical soil under field conditions. Joseph O. Lalah and Shem O. Wandiga (1999). Toxicological and Environmental Chemistry, Vol. 69, 459-468.
- 58 Biofuel consumption rates and patterns in Kenya (2001). Evans Kituyi, Jackson Marufu, Shem Wandiga, Isaac O. Jumba, Meinrat O. Andreae and Gunter Helas. Biomass and Bioenergy. 20, 83-99.
59. Biofuel availability and domestic use in Kenya , (2000). Evans Kituyi, Lackson Marufu, Beate Huber, Shem O. Wandiga, Isaac O. Jumba, Meinrat O. Andreae and Guenter Helas . Biomass and Bioenergy. 20, 71-82.
60. Carbon monoxide and nitric oxide from biofuel fires in Kenya , Kituyi, E., Marufu, L., Wandiga, S.O., Jumba, I.O., Andreae, M.O. and Helas, G. (2001). Energy Conversion and Management. 42, 1517-1542.
61. Accumulation, distribution and metabolism of 14C-1,1,1 - trichloro-2,2-bis(p-chlorophenyl) ethane (DDT) residues in a tropical marine ecosystems. S.O. Wandiga, D.M.K Ongeru, L. Mbuvi, J.O. Lalah and I.O. Jumba (2002). Environ. Technol. 23,1285-1292.
62. The distribution of organochlorine pesticides in marine samples taken from different locations along the Indian Ocean coast of Kenya (2002). S.O. Wandiga, P.O.Yugi, M.W. Barasa, I.O. Jumba and J.O. Lalah. Environ. Technol. 23,1235-1246.
63. Worker exposure and health risks from volatiles organic compounds utilized in the paint manufacturing industry of Kenya . Kathleen L. Purvis, Isaac O. Jumba, Shem Wandiga, Junfeng Zhang and Daniel M. Kammen (2001). Applied Occupational and Environmental Hygiene 16 (11) 1035 - 1042.
64. S.O. Wandiga (1999). Review of Crystallographic and Molecular Structures of Complexes formed between N,N ' -dialkyloxamides, and N,N ' -dialkydithio-oxamides, dialkylmolonamides, N,N ' -dialkylsuccinamides, and Toluene, 3,4 dithiol with group VB and IV metal holides. Pure and Appl. Chem, 71 (6) 1019 - 1024.
65. Variation of plant p,p' DDT uptake with age and soil type and dependence of dissipation and temperature. Welderufael G. Kiflom, Shem O. Wandiga, Peter K. Ng'anga and Geoffrey N. Kamau (1999). Environment International, 25, 479-487.
66. The Dissipation behaviour of malathion and dimethoate from the garden pea plant (Pisum sativa). Z.M. Getenga, J.I.O. Jondiko, S.O. Wandiga and E. Beck (2000). Bull. Environ. Contam. Toxicol. 64, 339 - 367.

67. The effect of boiling on the removal of persistent malathion residues from stored grains. J.O. Lalah and S.O. Wandiga (2002). *J. Stored Products Res.* 38,1-10.
68. The distribution, metabolism and toxicity of 14C-DDT in a model ecosystem simulating a tropical marine environment. S.O. Wandiga, I.O. Jumba, Mutaaga, W.G. and J.O. Lalah. (2004). *Toxicol. Environ. Chemistry*, vol 85, pp 253-268.
69. The Distribution, Fate and Effects of 14C-DDT in model ecosystems simulating tropical fresh water environment. Shem O. Wandiga, Bereket T. Yebiyo, Geoffrey N. Kamau, and Joseph O. Lalah (2001). *Tox. Env. Chem.* Submitted.
70. Joseph O. Lalah, Shem O. Wandiga (2002). The effect of boiling on the removal of persistent malathion residues from stored grains. *J. Stored Products Res.* 38, 1- 10.
71. J.O. Lalah, P.N. Kaigwara, Z. Getenga, J.M. Mghenyi and S.O. Wandiga (2001). The major environmental factors that influence rapid disappearance of pesticides from tropical soils in Kenya . *Toxic and Environ. Chem.* 00, 1-37
72. River pollution in developing countries - A Case Study II: Effect of industrial discharge on quality of Ruiruaka River waters in Kenya . (1990). S.B. Jonnalagadda, R.W. Odipo and S.O. Wandiga. *Bull. Chem. Soc. Ethiop.* 4 (2) 89.
73. River pollution in developing countries - A Case Study III: Effects of industrial discharge on quality of Ngong River waters in Kenya (1991). S.B. Jonnalagadda, A.S. Mathuthu, R.W. Odipo and S.O. Wandiga. *Bull. Chem. Soc. Ethiop.* 5 (2) 49 - 64.
74. Use and distribution of organochlorine pesticides in Africa (2001). S.O. Wandiga. *Pure and Applied Chemistry* 73 (7) 1147 - 1155.
76. Dissipation, distribution and uptake of 14C-chloropyrifos in a model tropical seawater/sediment/fish ecosystem. J.O. Lalah, D.M.K. Ongeru, S.O. Wandiga and I. O. Jumba (2003). *Bull. Env. Cont. and Toxic.* 70(5) , 883-889.
77. Environmental assessment of the East African Rift Valley Lakes . Eric O. Odada, Daniel O. Olago, Fred Bugenyi, Kassim Kulindwa, Jerome Karimumuryango, Kelly West, Micheni Ntiba, Shem Wandiga, Peninah Aloo-Obudho, Pius Achola (2003).. *Aquatic Sciences.* 65,254-271 .
78. Mitigation of environmental problems in Lake Victoria, East Africa : Causal Chain and Policy Options Analysis. Eric O. Odada, Daniel O. Olago, Kassim Kulindwa, Micheni Ntiba, Shem Wandiga (2004). *Ambio.* 33, No 1-2. Feb. 13-23.
79. The distribution, metabolism and toxicity of 14C-DDT on model aquarium tanks with fish and sediment simulating a tropical marine environment (2004). S.O. Wandiga, I.O. Jumba, W.G. Mutaaga and J.O. Lalah. *Toxicol.and Environ. Chem.* Vol.00,No. 0, pp1-16.
80. Studies on biodegradation of 2,4-D and metribuzin in soil under controlled conditions(2004). Z.M. Getenga, V. Madadi and S.O. Wandiga. *Bull. Environ. Contam. Toxicol.*72:504-513.

81. Determination of organochlorine pesticide residues in soil and water from River Nyando drainage system within Lake Victoria basin, Kenya (2004). Z.M. Getanga, F.O. Keng'ara and S.O. Wandiga. Bull. Environ. Contam. Toxicol. 72: 335-343.

82. Shem O. Wandiga^{1*}, Maggie Opondo², Daniel Olago³, Andrew Githeko⁴, Faith Githui⁵, Michael Marshall⁶, Tim Downs⁶, Alfred Opere⁵, Pius Z. Yanda⁷, Richard Kangalawe⁷, Robert Kabumbuli⁸, James Kathuri², Eugene Apindi³, Lydia Olaka³, Laban Ogallo⁵, Paul Mugambi⁹, Rehema Sigalla⁷, Robinah Nanyunja⁹, Timothy Baguma⁹, Pius Achola¹⁰, 2004. Vulnerability to epidemic malaria in the highlands of Lake Victoria basin: the role of climate change/variability, hydrology, health and socio-economic factors. Climate Change J. (Submitted).

83. Shem O. Wandiga (2005). Genetically modified foods: Potential, Fate and Future in Developing Countries. Science and Society. 4: 93-97.

84. Daniel Olago¹, Michael Marshall¹, Shem O. Wandiga^{2*}, Maggie Opondo³, Pius Z. Yanda⁵, Richard Kangalawe⁵, Andrew Githeko⁶, Tim Downs⁷, Alfred Opere⁴, Robert Kabumbuli⁸, Edward Kirumira⁸, Laban Ogallo⁴, Paul Mugambi⁹, Eugene Apindi¹, Faith Githui⁴, James Kathuri³, Lydia Olaka¹, Rehema Sigalla⁵, Robinah Nanyunja⁹, Timothy Baguma⁹, Pius Achola¹⁰. Climatic, Socio-economic and Health Factors Affecting Human Vulnerability to Cholera in the Lake Victoria Basin, East Africa. Ambio (Submitted)

PAPERS PRESENTED AT INTERNATIONAL MEETINGS

1. Trigonal Sexadentate Complexes of Schiff Base Derivatives of 1,1,1-Tris(aminomethyl)-ethane, S. O. Wandiga, J. E. Sarneski and F. L. Urbach, Abstract, 162nd National Meeting of the American Chemical Society, Washington, DC, September, 1971, No. INOR-132.
2. Electrochemistry and Electron Paramagnetic Resonance Spectra of Trigonal Sexadentate Metal Complexes with Schiff Base Derivatives of 1.1.1-Triaminocyclohexane, S. O. Wandiga and F. L. Urbach, pro. XIVth International Conference on Co-ordination Chemistry, Toronto, Canada, June, 1972.
3. 1,2,-Dithiolate and 2,3-Bis(thiosemicarbozono)-butane Complexes of Antimony(III). S. O. Wandiga, Proc. 16th International Conference on Co-ordination Chemistry, Ireland, August, 1974.
4. The Labializing Effect of the Trichloroethanoate on the Synthesis of Tris (2,4-pentanedione) Chromium(III), S. O. Wandiga and H. Ssekaalo. Pro. XVII International Conference on Co-ordination Chemistry, 6-10th September, 1976. Hamburg (Federal Republic of Germany).
5. The Influence of Health Problems on the Academic Performance of University Science Education in Africa, Nairobi, Kenya, August, 1975.
6. Environmental Consequences of Rural Development Policy: A Scientific Assessment. S. O. Wandiga, Proc. Seminar on Law and Rural Development, Kisumu, Kenya, July, 1977.

7. Guidelines for the Development of Environmental Quality Standards and Implementation Plans for Kenya . S. O. Wandiga, Proc. Seminar on Law and Rural Development, Kisumu , Kenya , July, 1977.
8. Intercomparative Analysis of Lead, Cadmium, Copper, Zinc and Mercury in Human Hair by Nuclear and Non-Nuclear Techniques. S.O. Wandiga, Paper presented at the Research Co-ordination Meeting on Nuclear Based Methods for Analysis of Pollutants in Human Hair, CEN, Saclay, Paris , France 27th November to 1st December, 1978 .
9. Factors Affecting the Determination of Lead, Cadmium, Copper and Zinc Content in Hair using Differential Pulse Anodic Stripping Voltammetry and Flame Atomic Absorption Spectroscopy, Shem O. Wandiga and Issac O. Jumba, proc. Regional Conference on Chemistry in Africa, The 1st International Chemistry Conference in Africa , July 28th -1st August, 1980 .
10. Persistence of Surface Deposited and Soil Incorporated DDT in Nairobi , Kenya , Shem O. Wandiga and Herbert C. B. Natwaluma. Ibid.
11. The Role of Scientists and Scientific Societies in Development. S. O. Wandiga, Paper presented at the African Regional Seminar on the Role of Scientific and Engineering Societies in Development. Grand Bassam , Ivory Coast , 10-14 December, 1984.
12. A Review of Chemical Reactions in the Atmosphere and their Impact on Environment; Shem O. Wandiga, proc. 1985 Eastern and Southern Africa Environmental Chemistry Workshop, University of Nairobi, 16-22 March, 1986.
13. New Prospects for University-Industrial Co-operation in Africa . Proc. 1st Scientific Conference of the Scientific and Sub-Network of African Network of Scientific and Technological Institutions (ANSTI), Addis Ababa , Ethiopia , May 28-30, 1986 .
14. Dissipation of persistent pesticides in the Tropics, using Isotope Techniques. 2nd FAO/IAEA Research Co-ordinating Meeting, 24-28, February, 1986, Quito , Ecuador .
15. The participation of women in Science and Technology in the Next Century. S. O. Wandiga, proc. Seminar/Workshop 32. The New Millennium. Women facing change. Scientific and Technological Aspects. Ljubljana , 25-29 August, 1986.
16. University-Industrial Co-operation in Chemistry. A UNESCO Project, S. O. Wandiga, proc. Seminar/Workshop 33. Frontiers in University Chemistry Teaching. Ljubljana , 4-8 September, 1986.
17. The Methane Emission by Termites. S.O. Wandiga, proc. 1986, Eastern and Southern African Environmental Chemistry Workshop, University of Malawi, Chancellor College, 14-18 December, 1986.
18. Developing Policy and Implementing Change in Higher Education in Kenya . Shem O. Wandiga, Paper presented at the Annual Conference of the comparative and International Educational Society. Annapolis , Maryland , 12-15 March, 1992.

19. The persistence and Fate of ¹⁴C-Malathion Residues in Stored Beans (*Phaseolus Vulgaris*) and Maize (*Zea Mays*). S. O. Wandiga and J. O. Lalah. 5th International Chemistry Conference in Africa, University of Botswana , Gaborone , 27-31 July, 1992.

20. Assessing the Incidence and Prevalence of Mineral Imbalances in Grazing Livestock in the Tropics: A case study in Western Kenya . Shem O. Wandiga and Isaac O. Jumba. 5th International Chemistry Conference in Africa, University of Botswana , Gaborone , 27-31 July, 1992.

21. Policy Formulation, Planning and Programming in Universities (With Reference to Kenya): Paper presented at Commission for Higher Education Seminar on Cost Reduction and Recovery and Alternative Ways of Funding Universities , Safari Park Hotel, Nairobi , 30th November to 4th December 1992 .

22. Education and Science in Africa : Some possible ways of improvement in the Twenty First Century. S. O. Wandiga, Presented at Workshop on Education and Science for the 21st Century, UNESCO, Paris 10-11 January 1994.

23. Theory and Environmental Chemistry: Partners for understanding. S.O. Wandiga, Proc. 1st Theoretical Chemistry Seminar, University of Nairobi , 24 - 28 Feb. 1995

24. Knowledge gaps in the understanding of Tropical Atmospheric Chemistry. S.O. Wandiga, Paper presented at the Nairobi Conference on Climate Change and its implication on Africa , 1990. ACTS/UNEP Conference.

25. Botanical composition has a greater influence on mineral concentrations in dry season pastures in W. Kenya than either soil origin on composition. I.O. Jumba, N.A. Suttle, E.A. Hunter and S.O. Wandiga. Proc. Environmental Geochemistry and Health in Developing countries, October 2:21 1993. The Geological Society, London .

26. Research Training: Kenya 's Experience, S.O. Wandiga, Proc. The Conference on Research Training for countries with a Limited Research Capacity. Karslundstrand , Denmark , September 9-13, 1995 .

27. Methods of Sourcing and Managing Finance in Higher Education. S.O. Wandiga. (1996). Paper Presented at the Workshop in the Institutional Management in Higher Education for Eastern and Southern African Countries, 14th-29th March, 1996, UNESCO Regional Office, Gigiri, Nairobi.

28. Sensitivity of Kenya Ecosystem to Acid Diposition: Validation of the SEI Map. I.O. Jumba, S.O. Wandiga and J.M. Njoroge. Paper presented at Stockholm Environment Institute (SEI) Workshop university of Zimbabwe Harare , Zimbabwe , 24-29 April, 1996.

29. River Pollution in Developing countries. A case study III: Effect of Industrial Discharges on Quality of ngong River waters in Kenya . S.O. Wandiga. (1996). Paper presented at Dissemination workshop on "Concentration of Heavy metals, Organochlorine pesticides, organic and microbial pollution in the Nairobi River and its tributaries. Sustainable Development Consultants workshop, June 4-5, Fairview Hotel, Nairobi .

30. Onger, D., Lalah, J.O., and Wandiga, S.O. (1998). The distribution, metabolism and persistence of ¹⁴C-DDT and ¹⁴C-Chlorpyrifos residues in sediment and fish in a model

tropical marine ecosystem. A poster presentation at the 7th International Chemistry Conference in Africa and 34th Convention of the South African Chemical Institute, 6 - 10 July, University of Natal, Durban, South Africa.

31. S.O. Wandiga (2000). Policy and options for persistent toxic substances use in agriculture and vector control. Paper presented at the scientific and Technical Advisory Panel (STAP) of Global Environment Facility (GEF) Brainstorming meeting in "Persistent Organic Pollutants," Barbados , 21 - 24 February.

32. S.O. Wandiga and Jane T. Otieno (1999). Management of solid waste in Nairobi city. A paper presented at the inter-regional workshop on technologies of sustainable waste management. Alexandria , Egypt , 13 - 15 July.

33. Public-private sectors partnership: A case for waste management in Nairobi . J.T. Otieno and S.O. Wandiga. A paper presented at the International Workshop on Resource mobilization for social Development organized by United Nations Department of Economic and Social Affairs (UNDESA) and the Korean Development Institute, 25 - 27 October, 2000.

34. New trends in chemistry teaching. S.O. Wandiga. A paper presented at a workshop during the 16th International Conference on Chemical Education 4 - 7 August, 2000 .

35. S.O. Wandiga. A Science policy on knowledge led society and development. World Science Forum, 8-10 Nov. 2003. Budapest.

36. S.O. Wandiga. The African Great Lakes : An example of where application of Knowledge on environmental issues for development is ripe. World Science Forum, 8-10 Nov. Budapest.

37. S O Wandiga. Thematic Paper: Lake Basin Management Problems in Africa : Historical and Future Perspectives. A paper presented at the ILEC conference, Hotel Intercontinental, November, 2003 Nairobi , Kenya

38. Shem O. Wandiga*, Vincent O. Madadi. Lake Victoria : will it support life tomorrow? A case for abatement of pollution and eutrophication of fresh waters. A paper presented at the Lake Victoria Environment Outlook Workshop, 2-4 September, 2004, Imperial Hotel, Kisumu.

39. Research, Information, Training and Development. S.O. Wandiga in Africa and Climate Change. Paper prepared for African Centre for Technology Studies and Stockholm Environmental Institute, Climate and Africa Project, Dec. 1994.

40. Methods of sourcing and managing finance in higher education. Wandiga, S.O. 1996. Paper presented at the UNESCO/IIEP Workshop on Institutional Management for Higher Education for Eastern and Southern African countries. March 14-29, Nairobi , Kenya .

41. Cost and Financing of Education in Kenya : Access, Quality and Equity in Higher Education and Training. Wandiga, S.O. et al. 1995. Nairobi : Victoria Training Centre, Ltd.

42. Public-Private Universities in Kenya : Partnership in Diversity. Wandiga, S.O. 2001. Women Education Researchers in Kenya / Ford Foundation Seminar Series. January.

43. The Right to Access to Healthcare. Wandiga, S.O. 2005. A paper presented at The International Conference "BIOETHICS & INTERNATIONAL LAW": Contribution to an International Declaration on Bioethics. 25-26 February, 2005. Institute Curie, 25, rue d'Ulm 75005 Paris , France . Organised by: The French Commission for UNESCO and the International Association for Law, Ethics and Science (IALES)

44. From Conventional Infrastructure to Technological Infrastructure Capabilities: A New Alternative for Harnessing Science and Technology. Wandiga, S.O. A paper presented at the International Symposium on Harnessing Science for Society: Further Partnership. Held on 2-5 March, 2005 at UNESCO's Office in Venice (Palazzo Zorzi- 4930 Castello, 30122 Venice , Italy

45. The role of science and technology in africa 's development: opportunities and challenges of engaging university institutions in biosciences.S.O. Wandiga, A paper presented at the First African Network for Science and technology Institutions (ANSTI) Regional Workshop on Biosciences for Vice Chancellors, Provosts and Deans of Sciences; Engineering and Technology. Accra Ghana , 15-17 th November,2005 .

46. R ole of science academies in development: perspectives from african academies experience. Shem O. Wandiga. A paper presented at the First Annual International Conference of the African Science Academy Development Initiative (ASADI), Hotel Inter Continental, Nairobi , 7-8 November, 2005.

RESEARCH ACCOMPLISHMENTS

1. Research Accomplished at the University of Nairobi

(a) Antimonial Schistosomicides

Support: East African Medical Research Council, East African Community and the University of Nairobi .

The basic premise of this research is that the nature of the binding feature in determining the toxicity of the drug vs its chemotherapeutic effectiveness against schistosomiasis. The overall objectives of the project are two-fold:-

(i) To establish the detailed chemical behaviour of known antimonial schistosomicides;

(ii) To design and synthesis a variety of new antimony (III) compounds for testing against schistosomiasis. Progress has been made in the synthesis of several new compounds. Their characterization and elucidation of exchange reaction between antimony (III) - cysteine systems were carried out by n.m.r./ir/uv-vis and X-ray crystallography.

(b) Stereochemistry and Reactions of Transition Metals

Support: University of Nairobi

I have supervised two postgraduate Ph.D. students in this area. One of the post-graduate students thesis is The Effect of Trichloroethanoate and Other Carboxylate Ions on the Formation of Tris:(2,4-pentanedionato)-Chromium (III) in Aqueous Solution. The second

student's work deals with The Synthesis and Characterization of Low Symmetry Schiff Base Metal Complexes.

(c) The Analysis of Chemical Pollution in Kenyan Water Systems

Support: The University of Nairobi and NCST

The analysis of heavy metals by use of Differential Pulse Anodic Stripping Voltammetry has been started. Several M.Sc. students have finished the analysis of trace metals by PASV and AAS methods.

(d) The Analysis of Heavy Metals in Human Hair

The project deals with an intercomparative analysis of Hg, Pb, Cd, Zn, Cu in Human Hair by Atomic Absorption Analysis and Polarographic Techniques.

(e) Analysis of mercury in cosmetics has been undertaken at both University of Nairobi and at University of Trondheim , NTH. The work at NTH was sponsored by a special NORAD Fellowship for one month.

(f) Termites: A Potentially Large Source of Atmospheric Trace Gases

Termites may emit large quantities of methane, CO₂ and other trace gases into the earth's atmosphere. Laboratory and limited field measurements indicate global annual emissions by termites to be 1.5 x 10¹⁴g CH₄, 46 x 10¹⁵g CO₂, 102 x 10¹¹g CO, and 7 x 10¹¹g of dimethyl disulphide. The emissions of methane and carbon monoxide can account for significant portions of their atmospheric budgets. The largest emissions occur in tropical areas disturbed by man.

(g) Dissipation of Persistent Pesticides in the Tropics: Several theses have shown that the half life of these chemicals are much shorter in the tropics. The residues of lindane in human milk has been shown to be low in Kenyan women. The distribution, effect and fate of these compounds in Kenyan marine environment were studied under a grant from the International Atomic Energy Agency.

(h) Studies on biofuel use in Kenya and emission of greenhouse gases from biomass burning has proved that biomass shortage is a potential problem for Kenya in the future given the rate of use and population increase. At present greenhouse gases emission is not a major contributor to the global warming.

(i) Scientific Research in basic Sciences: Improvement of chemical education at secondary and tertiary levels have been launched through microscience experiments projects. The project will be extended to biology and physics microscience experiments.

(j) Assessment of Impact and Adaptation to Climate Change: Principal investigator in project called "Capacity building to evaluate and adapt to climate-change-induced vulnerability to malaria and cholera in the Lake Victoria Region.

2. Research Accomplished at Case Western Reserve University

Synthesis and characterization of several complexes with sexadentate ligands which impose a trigonal symmetry on the metal ion has been accomplished. These complexes provide a good example of metal ions in a trigonally distorted ligand field and their electronic properties, redox properties, electron paramagnetic properties have been investigated. Certain of these complexes undergo facile racemization via a trigonal twist mechanisms as shown by their n.m.r. behaviour as a function of temperature.

3. Research Accomplished at the University of Maryland

Synthesis of monohalogermanes and determination of their electric dipole moments by non-resonant microwave absorption of vapours has been accomplished. This study has shown that the (p => d) pi bonding is less important than in monohalosilanes. The microwave work was performed at the U. S. National Bureau of Standards.

RESEARCH SUPPORT

1. 1974 East African Medical Research Council, East African Community "Antimonial Anthelmintic Agent", K.Shs.55,000/-.
2. 1973 University of Nairobi Research Grant, "Antimonial Anthelmintic Agent", K.Shs.15,000/-.
3. 1989 University of Nairobi Research Grant, "The Analysis of Chemical Pollution in Kenya Water Systems", K.Shs.10,000/-.
4. 1987 - 1995 UN International Atomic Agency, "The Analysis of Heavy Metals in Human Hair and Fate and Persistence of Pesticides in the Tropics", US\$125,850.
5. 1985 National Council for Science and Technology grant, "Analysis of Nitrosamines in Alcoholic Beverages and Grains in Kenya", K.Shs.52,000/-.
6. 1982/85 UN International Atomic Energy Agency, "Dissipation of Persistent Pesticides in the Tropics", US\$17,000.
7. 1985 National Science Council, "Analysis of Elements in Kenyan Waters", US\$4,000. 8. 1986 - 1995 UNESCO/NORAD support to the Eastern and Southern Africa Environmental Chemistry Network, US\$140,000.
8. 1997 - 1999 UNESCO Support for innovation in science teaching US\$ 89,000.
9. 1996 - 1999 IAEA Distribution, fate and effect of persistent pesticides in tropical marine ecosystem US\$ 67,000.
10. 1998 UNESCO/ACS support to Kenya. Books, journals, equipment and consumable supplies to Chemistry Department, University of Nairobi. US\$ 2 million.
11. 1998/1999 Government of Japan support for Microscience experiments for Kenyan secondary schools \$36,686.

12. AIACC: TWAS/START regional assessment project, US \$ 224,800.

BOOKS

1. *Capacity Building and Institutional Development in Higher Education in Kenya* . S.O. Wandiga, (1997) International Institute for Educational Planning (IIEP) UNESCO 1997.
2. Effects of botanical composition, soil origin and composition on mineral concentrations in dry season pastures in Western Kenya . Jumba I.O., Suttle, N.F, Hunter, E.A. and Wandiga, S.O. (1996). *In Environmental Geochemistry and Health* . Eds. J.O. Appleton, R. Fuge and G.J.H. Mc Call. Geological Society special publication No. 113. Geological Society Publishing House , U.K.
3. Research Training: The Kenyan Experience. S.O. Wandiga. (1996). In: *Research Training for Development* - Proceedings of conference on Research Training for countries with limited Research Capacity. Eds. Erik. W. Thulstrup and Hans D. Thulstrup. Roskilde University Press p.145-152.
4. *Environment and Development* : Proc. of a Public Lectures series of Kenya National Academy of Sciences (KNAS). S.O. Wandiga and N.L. Abuodha (Eds.) Kenya National Academy of Sciences Press, 1996.
5. Shem O. Wandiga and Eric Odada (2001). SCIENCE AND SOCIETY: Africaâ€™S PERSPECTIVE, in Science and Technology Policy (OFW) from *Encyclopedia of Life Support Systems (EOLSS)* , Developed under the Auspices of the UNESCO, Eolss Publishers, Oxford, UK, [<http://www.eolss.net>]
6. Biomass Burning in Africa : Role in atmosphere change and opportunities for emission mitigation. E. Kituyi, S.O. Wandiga, M.O. Andreae and G. Helas. (2005). In: *Climate Change and Africa* . Pak Sum Law. (ED). Cambridge University Press, Cambridge . p79-89.
7. S.O. Wandiga, (1999). Interview. In: *21 Scientists in the 21 st Century* . Ed. Andra's Erd'elyi. Tertia Publishers Budapest , Hungary .
8. Pesticides in Kenya : Wandiga, S.O., P.N. Kaigwara, J.O. Lalah (1997). In: "*Pesticide and Residues in Coastal Tropical Ecosystems. Distribution, fate and effects*" Eds. M D. Taylor S.J. Kleine, F.P. Carvalho, Damia Barcelo and Jan Everaats. Taylor and Francis , New York , 2003. pp 49-80.
9. International University-Industry Cooperation: Camomile Project. (2001). B. Boh, D.N. Kariuki, A Kornhauser, J.O. Midiwo, S.O. Wandiga . In: University Industry Government Cooperation. How to make it work? Teaching Learning Manual based on examples of good practice in research, teaching and management from chemistry and related disciplines. UNESCO-ICCS 2001, Littera Picta Ljubljana , pp. 360-388.
10. Wandiga, S.O., M. Opondo, D. Olago, A. Githeko, F. Githui, M. Marshall, T. Downs, A. Opere, P.Z. Yanda, R. Kangalawe, R. Kabumbuli, J. Kathuri, E. Apindi, L. Olaka, L. Ogallo, P. Mugambi, R. Sigalla, R. Nanyunja, R. Baguma, and P. Achola. 2005. "Vulnerability to climate induced highland malaria in East Africa ." In N. Leary, C. Conde, A. Nyong and J. Pulhin, eds., *Dimensions of vulnerability in a changing climate, case studies from the developing world* . Draft manuscript.

11. Pius Z. Yanda, Shem O. Wandiga * , Richard Y.M. Kangalawe, Maggie Opondo, Dan Olago, Andrew Githeko, Tim Downs, Robert Kabumbuli, Alfred Opere, Faith Githui, James Kathuri, Lydia Olaka, Eugene Apindi, Michael Marshall, Laban Ogallo, Paul Mugambi, Edward Kirumira, Robinah Nanyunja, Timothy Baguma, Rehema Sigalla, Pius Achola (2005). Adaptation to climate change - induced malaria and cholera in the Lake Victoria region. In: AIACC Adaptation Synthesis Book. Ed. Ian Burton . Manuscript in preparation.

PUBLIC LECTURES

1. Organochlorine Pesticides: Curse or Blessing in Tropical Agriculture. S.O. Wandiga. the Kenya National Academy of Sciences Public Lecture Series on Environment and Development. 29th March 1995 , Mt. Kenya Safari Club, Nairobi , Kenya .
2. S.O. Wandiga (1998). Review of crystallographic and molecular structures of complexes formed between N,N'-dialkyloxamides, N,N'-dialkyldithioxamides, N,N'-dialkylmalonamides, N,N' dialkyldithiomalonamides, N,N'-dialkylsuccinamides, and Toluene, 3,4 - dithiol with group VB and group IV metal halides. Plenary lecture presented at 7 th International Chemistry Conference in Africa and 34 th Convention of the South African Chemical Institute, 6 - 10 July. University of Natal , Durban , South Africa .
3. State of Science and Technology in Higher Education in Africa . S.O. Wandiga (1999). COREVIP'99, Conference of Rectors Vice-Chancellors and Presidents of African Universities, Revitalising Universities in Africa: Strategy for the 21 st Century, Arusha , Tanzania , 1-4 February. Paper presented at "Workshop on Human Resources Capacity Building in Science and Technology", 4 Feb. 1999 .
4. Undergraduate education in Chemistry: A Survey of Botswana and Kenyan universities. S.O. Wandiga (1999). Presidential Symposium on "Undergraduate Chemistry Education Around the Globe", ACS National Meeting in Anaheim , CA. U.S.A, March 22.
5. S.O. Wandiga (1999). Science for Development. Plenary Lecture, World Conference on Science, Budapest , 26 June - 1 July, 1999 , Budapest , Hungary .
6. S.O. Wandiga (1999). Science, ethics and responsibility in a globalized economy. Paper presented at Forum I of the thematic meetings on Science, ethics and responsibility. World Conference on Science, 26 June - 1 July, Budapest , Hungary .
7. S.O. Wandiga (2000). Basic Sciences in the 21 st Century. Prospects and challenges. Plenary Lecture presented at Perspectives in Basic Sciences, Vilnius , 22 - 23, March also presented at Faculty of Science, College of Biological and Physical Sciences, University of Nairobi , 11 April.
8. S.O. Wandiga (2000). Teaching Basic Sciences in Kenya . A need for innovation. Paper presented at a meeting in UNESCO Associated Centres in Basic Sciences, Vilnius , 24 - 25 March and at Yemeni National Commission for UNESCO workshop on Microscience, 6 April.
9. Organochlorine Pesticides: Future use in Africa . (2001). 8 th International Chemistry Conference in Africa , Plenary Lecture. July 31 st - 4 th August 2001 , Dakar , Senegal .

10. Fine Particulates and Human Health: A neglected research area in Africa . 2004. 9 th International Chemistry Conference in Africa (ICCA), Plenary Lecture. 2 nd -7 th August. Arusha , Tanzania

LIST OF STUDENTS SUPERVISED

Ph.D. STUDENTS:

Name	Year
Dr. H. Ssekaalo	1975
Dr. J. Irina	1977
Dr. C. G. Nyagah	1984
Dr. I. O. Jumba	1991
Dr. J. O. Lalah	1994
Mr. J. M. Makopa	On going
Dr. Z. Getenga	1999
Dr. E.N. Kituyi	2000
Mrs. Deborah Abongo	On going
Mr. C.M. Barasa	On going
Mr. David Ongeri	On going
Maurice Barasa	On going
Betty Naziriwo	On going
Vincent Madadi	On going

M.Sc. STUDENTS:

Name	Year
Mr. I. O. Jumba	1980
Mr. K. H. Limo	1980
Mrs. L. K. Kanja	1981
Mrs. L. N. Alala	1981
Mr. Herbert C. B. Natwaluma	1981
Mr. J. A. Z. Muggedo	1984
Mr. J. Onyari	1985
Mr. P. K. Bor	1985
Mr. E. O. Okello	1986
Mr. J. M. Mghenyi	1988
Mrs. A. Mutere	1989
Mr. P. Nganga	1995
Mr. E.N. Kituyi	1995
Mr. Kiflom G.W.R.	1996
Ms. S. Njogu	1999
Ms. L. Mbuvi	1999
Mr. D. Ongeri	1999
Mr. C.M. Barasa	1999
Mr. P.O. Yugi	2000
Ms. G. Mutaaga	2000

Mr. Bereket Yebiyo	2000
Mr. Vincent Madadi	2004

EXTERNAL EXAMINER TO THE DEPARTMENT OF CHEMISTRY OF:-

1. Addis Ababa University 1979
2. University of Zimbabwe 1983-1985
3. University of Swaziland 1984-1985
4. University of Botswana 1984-1985
5. University of Malawi 1983-1986
6. National University of Lesotho 1982-1986

PARTIAL LIST OF DOCUMENTS PREPARED BY POLICY AND PLANNING TASK GROUP UNDER MY CHAIRMANSHIP FOR MINISTRY OF EDUCATION

1. Republic of Kenya, Ministry of Education. "University Education in Kenya: Request for World Bank Credit". June 1991.
2. Republic of Kenya, "Report of the Review Committee for the Establishment of an Institution to Manage the University Students Loan Scheme", November 1991.
3. Republic of Kenya, Ministry of Education. "Report of the Review and Harmonization of Legal Framework Committee", March 1993.
4. Ministry of Education, Policy and Planning Task Group, "Budgeting Guidelines for Universities", January 1993.
5. Ministry of Education, Policy and Planning Task Group, "Planning Guidelines for Universities", June 1993.
6. Republic of Kenya, Ministry of Education, Policy and Planning Task Group. "Public Universities Financial Plan 1994/95 to 1996/97", June 1994.